

Interpretive Structural Modeling for introducing of image information system at the middle-scale hospitals

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Abstract

We extract and analyze the decision factors of introducing image information system by ISM (Interpretive Structural Modeling) method to determine the criteria and structure for system selection. As a result, 15 factors were extracted, and the structure and relation among factors became clear.

Introduction

When the medical image information systems such as CR (Computed Radiography) system are introduced into the hospitals, the decision factors such as the operability of equipment and the hospital profit are intertwined complicatedly. Method of ISM (Interpretive Structural Modeling) could be used to grasp objectively the various factors including the intuition and vagueness decisions and to express visually the complicated structures. We think that the ISM method can be applied in field of the medical informatics. The purpose of this study is to analyze and to make clear the decision factors of introducing CR system (as an example of the image information system) at the middle-scale hospitals using the ISM method.

Methods

This study was designed in the following three processes. The decision factors were picked up by an interview survey. The subjects of interview survey were five radiological technologists who worked at a middle-scale hospital (200-300 beds). The ages of the radiological technologists were 35 to 50 years old. Interview survey was performed by the method of free association. The key words related with that of introducing the CR system were associated freely by the participants. The interviewers were not allowed to question and to remark the leading questions. The proposed key words were considered as the decision factors and its validity was confirmed by the simulated KJ method. Finally the structure of the decision factors were made and analyzed by ISM method.

Results and Discussion

(1) Decision factors of introducing the CR system

15 factors were proposed as follows. The * mark in the text and the dotted line in the figure were expressed as a negative impression. (A) System operability: The system should be easy to operate. (B) Working load: The working load of radiological technologist should decrease in comparison with before. (C) Expectation to

digital system: A digital image system should be evaluated in future. (D) After-sale service: The after-sale service of a vender should be good. (E*) System size: The size of system might be large (there are many accessories). (F*) System price: The price of system might be expensive. (G) Processing time: The time of image processing should be short. (H) Relationship with vender: The relationship of mutual trust with the system vender should be good. (I) Manner of vender: The manner of the persons in charge of the system sale should be good. (J) Same image: Same images can be obtained at any time. (K*) Same image quality: Same image quality can be obtained irrespective of whoever taking it. (L) Guaranteed quality: The image quality is guaranteed in certain degree. (M) Storage space: The space of image storage should be small. (N) Hospital profit: The hospital profit should increase (O) HIS/RIS connection: The connection of HIS/PACS should be possible.

(2) ISM Analysis

Figure showed the result of ISM analysis. The figure indicated the following points. Both factors of H(Relationship with vender) and N(Hospital profit) located the higher level of concept hierarchy independently, and these two factors played an important role in introducing the CR system. The factors of B(Working load), C(Expectation to digital system) and F(system price) were located under N(Hospital profit). Especially, the factor of C(Expectation to digital system) included the five factors related with the routine technical work.

As a limitation of this study, we did not feedback these ISM results to a clinical field. We plan to take the assessment of the reliability and validity of ISM results in the future.

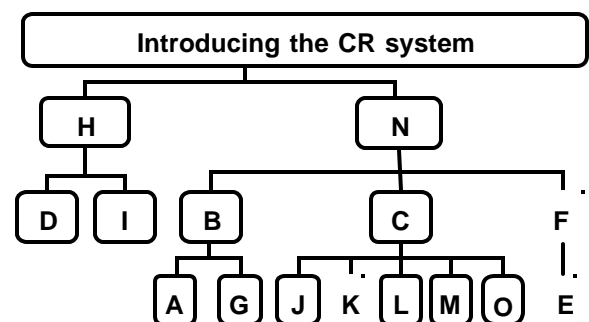


Figure. ISM of introducing the CR system